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AUTHOR Carroll, John B.
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ABSTRACT

The nature of foreign language aptitude and the consequent implications for teaching are discussed. Areas include teaching of aptitudinal skills, diagnosis of individual difficulties, necessity of identifying sounds as unique entities, "audiolingual habit theory" vs. "cognitive code learning theory," and inductive and deductive teaching techniques. (MS)

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RESEARCH MEMORANDUM

IMPLICATIONS OF APTITUDE TEST RESEARCH AND PSYCHOLINGUISTIC THEORY FOR FOREIGN LANGUAGE TEACHING

John B. Carroll

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John B. Carroll
Educational Testing Service

Twenty years ago there was considerable skepticism that foreign language aptitude could be measured with sufficient precision to be of practical use. Advances in psychometrics and in our understanding of the nature of language and of language learning have made possible the development and wide application of several tests of foreign language aptitude--the Modern Language Aptitude Test in its various English and foreign language versions (Carroll & Sapon, 1959, 1967; Correll & Ingenkamp, 1967; Ferencich, 1964), and the Pimsleur Language Aptitude Battery (1966).

The knowledge we now have about the components of foreign language aptitude that have been identified in the course of this research can, I believe, lead to new insights into problems of foreign language learning and teaching, and it is to this possibility that I wish to address myself here.

First, let me recount a few facts about foreign language aptitude and its testing. In the main, the work has been concerned with attempting to predict the rate at which persons at the secondary school, university, and adult levels would successfully master a foreign language, but useful tests of foreign language aptitude for elementary school children have been devised in both English and German. Research suggests that

individual differences in foreign language aptitude are universal and highly generalized in two senses: first, in the sense that aptitude is equally relevant to any foreign language that the individual might choose to study, and second, in the sense that individual differences in foreign language aptitude are found equally among the native speakers of different languages. Language aptitude can be measured by tests that can be administered in about an hour or sometimes less. Depending partly on how a foreign language is taught and the conditions of learning, there are often striking relationships between measures of aptitude and of achievement in foreign language learning. In some of my own work I have obtained multiple correlations as high as .84; Pimsleur has obtained validity coefficients nearly as high as this in some of his studies. On the other hand, there are apparently types of foreign language teaching situations in which the validity coefficients are much lower; sometimes they are not significantly different from zero. I have tried to develop a theory (Carroll, 1962) to account for this variation in validity--a theory that attempts to take into account the role of such variables as motivation, opportunity to learn, quality of instruction, and general verbal intelligence, in addition to specific foreign language aptitudes. I have suggested, in fact, that a model such as this, which I call "a model of school learning," can be applied to instruction in many other subjects besides foreign language (Carroll, 1963). In brief, the theory suggests that if aptitude is reflected in how much time an individual needs to learn something under optimal conditions of motivation, opportunity to learn, and quality of instruction, the role of aptitude can be either increased or decreased when these other conditions are varied. But it would be a

digression from the major theme of this paper to discuss the details of this model.

It has been puzzling to me that there has been little recognition of the implications of foreign language aptitude research in current theories of native language acquisition. According to these theories, as propounded for example by Lenneberg (1967), the ability to acquire one's first language is largely innate, but exists only during a certain critical period, say during the first six or seven years of life, after which it declines almost to a vanishing point by the age of puberty. To be sure, learning a second language is in many respects quite different from learning one's mother tongue, but certainly these kinds of learnings have some common properties. For example, both require the capacity to remember and reproduce sounds and to acquire and apply grammatical rules. I believe it is reasonable to propose a somewhat modified theory of language acquisition that would apply to both native and second languages, namely that while there may be a "critical period" in the early years of life, during which the individual has a heightened capacity to learn <u>any</u> language (be it native or foreign), there are individual differences in the degree to which this capacity declines, and that these individual differences are, in effect, differences in foreign language aptitude. Persons with high foreign language aptitude at puberty or beyond are those who have for some reason lost little of the language acquisition ability with which they are natively endowed, whereas those with poor foreign language aptitude are those who have lost most of this innate ability. I would emphasize that this is only a speculation, one that we may not be able to confirm until appropriate longitudinal studies are performed. Parenthetically, I

should also remark that although I can accept the notion of innate language acquisition ability or abilities, I do not subscribe to the strong form of this theory which claims that a "language acquisition device" is specially adapted for learning the particular form taken by human language, as suggested by McNeill (1971).

Let us look more closely at the nature of foreign language aptitude. Correlational and factor-analytic studies suggest that it consists of several relatively independent abilities (Carroll, 1958). Those that have been most clearly identified are phonetic coding ability, grammatical sensitivity, and inductive ability.

Phonetic coding ability is the ability to identify, and store in long-term memory, new language sounds or strings of sounds. For example, if a person is presented with a string of two or three auditory nonsense syllables and then made to do a distracting task such as mental arithmetic for ten seconds, after which he is asked to repeat the nonsense syllables, his ability to do so is related to his success in learning foreign languages. A somewhat more indirect, but more practical measure of this ability is a test in which the individual has to learn the phonetic transcriptions for a series of phonemes, either phonemes in his own language or in a foreign language, by noticing the correspondences between heard sounds and the printed symbols. Apparently, success in this learning task depends on success in remembering the identities of the sounds. It seems obvious that phonetic coding ability is demanded in the learning of a foreign language, because the individual must not only learn the identities of the new phonemes of that language, but must also recognize and remember the phonetic sequences represented by the morphemes, words, and intonation contours of that language.

Grammatical sensitivity may be defined as the individual's ability to demonstrate his awareness of the syntactical patterning of sentences in a language and of the grammatical functions of individual elements in a sentence. Although it is often said that linguistic "competence," in the sense defined by Chomsky (1965), involves some kind of "knowledge" of the grammatical rules of a language, this "knowledge" is ordinarily out of conscious awareness. (In fact, I shall suggest, later in this paper, that this "knowledge" is better regarded as a system of habits, contrary to Chomsky's interpretation of it.) A person who is "competent" in a language is able to create and understand new grammatical sentences without being aware of the "rules" underlying such sentences, much less being able to formulate those rules. Nevertheless, some adolescents and adults (and even some children) can be made to demonstrate an awareness of the syntactical structure of the sentences they speak. The most direct test of this ability consists of a series of items in which pairs of sentences are presented to the subjects. In each pair, a particular word or phrase is singled out for attention in the first sentence, and the subject has to find a word or phrase in the second sentence which has an analogous grammatical function. Even among adults, there are large individual differences in this ability, and these individual differences are related to success in learning foreign languages, apparently because this ability is called upon when the student tries to learn grammatical rules and apply them in constructing or comprehending new sentences in that language.

A third major component of foreign language aptitude is inductive ability. It is not yet certain whether this is the same kind of inductive ability that is measured by factor-analytic tests of the so-called Inductive Reasoning factor, but I am inclined to believe that it is. It is probably

through this factor that foreign language aptitude is most closely associated with general intelligence (the other factors being, apparently, much less correlated with intelligence). In the case of language learning, inductive ability is the ability to examine language material (in either auditory or printed form) and from this to notice and identify patterns of correspondences and relationships involving either meaning or grammatical form. A typical method of measuring this ability is to present materials in an artificial language in such a way that the individual can induce the grammatical and semantic rules governing that language. Such an ability might well be called upon in the learning of an actual foreign language, because even in a form of teaching that emphasizes the formal presentation of rules, the learner must inevitably work out the application of the rules for himself.

What implications do these findings have for the teaching of foreign languages?

One view of aptitude is that it represents the degree to which the individual has mastered the skills that are requisite to a learning task--i.e., the "entering behaviors" for the task, in the terminology employed by behavioristically-oriented psychologists. If this view is correct, it should be possible to improve aptitude, and indirectly, improve learning efficiency, by giving specific training in the skills tested by aptitude measures. To my knowledge, the only important study of this possibility has been conducted by Robert Politzer and Louis Weiss of Stanford University (Politzer & Weiss, 1969). Unfortunately, I am unable to agree entirely with the limited conclusions reached by these investigators, because of what I consider to be flaws in their research designs. One of their findings, however, was quite clear: when an attempt was made to give specific training in certain language aptitude skills in conjunction

with regular language courses, this training tended to be resented by the students involved, who could not perceive its relevance and usefulness in foreign language learning. But as I would interpret their results, this training (as opposed to no training, or to a "placebo" type of training involving cultural enrichment studies) had no significant effect either in improving language aptitude or in accelerating progress in foreign language learning. The gains in aptitude that did occur in both experimental and control groups were attributed by the authors to the effects of the regular language training, but at least part of these gains could have been due to practice and maturation effects. There was some evidence that aptitude training conducted <u>outside</u> the context of foreign language training, viz., in "study skills" classes, could produce some improvement in grammatical sensitivity, but this result is possibly flawed by the fact that the mean initial aptitude level of the study skills classes was, apparently, considerably lower than that of the language training classes. About all that can be said as a result of the Politzer-Weiss study is that the design and possible usefulness of training in foreign language aptitude skills needs much further investigation.

There are some general grounds for pessimism regarding the teaching of aptitudinal skills. It is the usual finding that training tends to increase rather than decrease individual differences (Anastasi, 1958) even when absolute levels of performance are improved on the average. If foreign language aptitude is linked to native endowments in language acquisition ability in the way I have suggested earlier, it may be difficult for training to override the effects of native endowment. And even if training can improve <u>measured</u> aptitude, this effect may be quite specific to the measures employed and may not transfer to the language learning task itself.

The papers at this colloquium are to be addressed to future prospects more than to the consideration of past work, and in this spirit I wish to propose that the findings of aptitude research are more likely to have implications for foreign language teaching if they are viewed as suggesting strategies of learning and teaching within the context of language training rather than suggesting techniques of training prerequisite skills.

At one level of application, aptitude measures provide means of diagnosing the patterns of difficulties exhibited by learners. From the fact that the components of foreign language aptitude are not highly correlated, it follows that these patterns will vary from student to student. With a knowledge of the profile of the individual student, the teacher may be in a better position to individualize instruction by directing special attention to the learner's difficulties.

At a higher level of application, specific techniques of teaching that may be useful for all students are suggested.

The fact of individual differences in phonetic coding ability implies that the student's problem is not so much one of discriminating sounds, as commonly believed among language teachers, as it is one of identifying sounds as unique entities and storing them in memory. Discrimination of sounds is necessary, of course, but it is in a sense incidental to the identification and storage processes. The distinction I am making between discrimination and identification is analogous to that between relative and absolute judgment; in fact it is a special case of this. The student must therefore be taught to identify and produce particular sounds, not merely to notice differences between sounds. Identification may be facilitated by giving each sound its own "tag"--a particular phonetic

symbol, in the case of a phoneme, or a meaning, in the case of morphemes or similar meaningful elements.

Of course, this is a principle that many language teachers have long observed and applied in this teaching, but it may serve as a reminder to some.

The fact of individual differences in grammatical sensitivity and its relevance to foreign language success, however, is more central to the perennial problems of language teachers and deserves much more attention. Teachers tend to assume a high degree of this ability in their students, not realizing that for some, grammatical explanations will be quite incomprehensible. Even in their native language many students have little or no awareness of the grammatical structure of sentences or the function of grammatical elements in them. They are unprepared, then, to perceive grammatical patterns in a foreign language, especially when these grammatical patterns differ in important respects from those in their native language. Concepts such as "subject," "predicate," "preposition," "indirect object," and "adjective complement" must be developed in a concrete way through illustrations in the native language before they are applied to, or contrasted with, phenomena in the foreign language.

At this point many will object that this recommendation goes counter to certain theories and practices of language teaching that avoid reference to grammatical terminology or even avoid any form of grammatical analysis. These theories appeal to the presumed fact that children learn their native language without acquiring a conscious perception of its grammatical apparatus. They claim, therefore, that languages should be taught mainly by repeatedly exposing the learner to examples of spoken foreign language material and having them practice producing and comprehending sentences

from this evidence. This is roughly what I have elsewhere called the "audiolingual habit theory" (Carroll, 1965).

There are several arguments against this position. (1) Since aptitude measures of grammatical sensitivity predict foreign language success in persons of an age beyond that of primary language acquisition, processes involving this skill must play a rcle in foreign language acquisition in at least some of these learners, and probably in most of them. (2) It is not certain that children learn their native language without conscious perception of its grammatical apparatus. Granted, they do not learn any grammatical terminology, but it may be that they acquire grammatical competence on what may be called a conceptual level. See, for example, a recent proposal by Schlesinger (1971) to the effect that children (and adults) produce sentences by a kind of manipulation of grammatical concepts. (3) Tests of grammatical sensitivity do not employ grammatical terminology, yet they do tap the individual's ability to perceive grammatical relationships. (4) Even in the process of attempting to learn by an audiolingual habit method, successful learners often report that their strategy is to make sense of the material by casting it into grammatical frameworks.

At the opposite extreme from the audiolingual habit theory stands what I have called the "cognitive code-learning theory," a theory that maintains that a foreign language is to be learned by a conscious application of grammatical rules. Some traditional methods of language teaching assume this, and on the whole, they are as successful as methods that are based on the audiolingual habit theory (see Carroll, 1969). But their success or failure must depend at least in part on the degree to which they offer practice in application of grammatical and semantic rules. We have here

a case in which adherence to any one extreme theory misses the virtues of the opposing theory. Both conscious analysis of grammatical patterns and practice in the automatization of habits based on those rules would appear to be necessary in an adequately efficient regime for the learning of foreign language. The case can be made that language performance is based on habits of translating intentions into grammatically acceptable sentences and habits of perceiving the grammatical structure of sentences heard or read. The teaching of a foreign language should involve the teaching of those habits through the gradual automatization and internalization of strategies that are initially at the level of conscious awareness and perception.

Finally let us consider the implications of individual differences in inductive ability. Again our claim that inductive processes must be involved somehow in language learning is based on the evidence that tests of this ability correlate with achievement. The most important lesson to be drawn from this is the fact that we must provide the learner with the kind of material that will most readily allow him to make use of whatever inductive ability he may have. In first language acquisition, the child is able to make inductions from an enormous amount of material, even though it is not presented in any efficient or systematic manner. The older learner of a foreign language will want to learn more efficiently. For him, anything that can be done to put similarities and contrasts into bold relief--for example, to group together exemplars of one principle alongside of exemplars of a contrasting principle--will make learning easier and more efficient.

This procedure is closely bound to the necessity of fostering awareness of grammatical and semantic rules at a conceptual level, as I have just mentioned, for the internalization of those rules probably operates best when the learner has the opportunity to analyze and perceive for himself the operation of those rules. It is too easy for the teacher to make an explicit statement of a rule (in a "deductive" mode of teaching) without also presenting concrete examples that contain the similarities and contrasts that allow the student to make an inductive internalization of the rule. It is useless to assume that teaching must be either purely deductive or purely inductive; both processes are of equal importance.

All would agree that teaching procedures should be based on sound principles. Aptitude test research represents one source of such principles, but even these need further refinement and testing.

References

Anastasi, Anne. Differential psychology (3rd ed.). New York: Macmillan, 1958.

Carroll, John B. A factor analysis of two foreign language aptitude batteries. Journal of General Psychology, 1958, 59, 3-19.

Carroll, John B. The prediction of success in intensive foreign language training. In Robert Glaser (Ed.) Training research and education. Pittsburgh: Univ. of Pittsburgh Press, 1962. Pp. 87-136. (Also, New York: Wiley, 1965; ERIC Document Reproduction Service Document No. ED 038 051.)

Carroll, John B. A model of school learning. Teachers College Record, 1963, 64, 723-733.

Carroll, John B. The contributions of psychological theory and educational research to the teaching of foreign languages. Modern Language Journal, 1965, 49, 273-281. (Also pp. 365-381 in G. Müller (Ed.) International Conference on Modern Language Teaching. Berlin: Franz Cornelsen Verlag, 1965.)

Carroll, John B. What does the Pennsylvania foreign language study tell us? Foreign Language Annals, 1969, 3, 214-236.

Carroll, John B., & Sapon, Stanley M. Modern Language Aptitude Test, Form A. New York: The Psychological Corporation, 1959.

Carroll, John B., & Sapon, Stanley M. Modern Language Aptitude Test--Elementary. New York: The Psychological Corporation, 1967.

Chomsky, Noam. Aspects of the theory of syntax. Cambridge, Mass.: M.I.T. Press, 1965.

Correll, W., & Ingenkamp, K. (Eds.) Fremdsprachen-Eignungstest für die Unterstufe, Test FTU 4-6. Weinheim-Berlin: Julius Beltz Verlag, 1967.

Ferencich, Mario (Ed.) Reattivo di Attitudine Linguistica; Adattamento italiano e taratura. Firenze: Organizzazioni Speciali, 1964.

Lenneberg, Eric H. Biological foundations of language. New York and London: Wiley, 1967.

McNeill, David. The capacity for the ontogenesis of grammar. In Dan I. Slobin (Ed.) The ontogenesis of grammar: A theoretical symposium. New York and London: Academic Press, 1971. Pp. 17-40.

Pimsleur, Paul. Language aptitude battery. New York: Harcourt, Brace & World, 1966.

Politzer, Robert L., & Weiss, Louis. An experiment in improving achievement in foreign language through learning of selected skills associated with language aptitude. Final report, July 1969, Stanford University, Stanford, California, Contract No. OEC-4-6-051097-1231, U.S. Office of Education. (ERIC Document Reproduction Service, Document No. ED 046 261.)

Schlesinger, I. M. Production of utterances and language acquisition. In Dan I. Slobin (Ed.) The ontogenesis of grammar: A theoretical symposium. New York and London: Academic Press, 1971. Pp. 63-101.